

SEQUENCE LISTING

<110> CALIFORNIA INSTITUTE OF TECHNOLOGY
LYAPINA, Svetlana
VERMA, Rati
DESHAIES, Raymond

<120> REGULATION OF TARGET PROTEIN ACTIVITY THROUGH MODIFIER PROTEINS

<130> CIT1510-3

<150> US 60/261,314
<151> 2001-01-12

<150> US 60/322,322
<151> 2001-09-14

<150> US 60/322,030
<151> 2001-09-14

<160> 22

<170> PatentIn version 3.1

<210> 1
<211> 14
<212> PRT
<213> Artificial sequence

<220>
<223> JAM domain

<220>
<221> MISC_FEATURE
<222> (1)..(14)
<223> Xaa is any amino acid

<400> 1

His Xaa His Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp
1 5 10

<210> 2
<211> 17
<212> PRT
<213> Artificial sequence

<220>
<223> JAM domain

<220>
<221> MISC_FEATURE
<222> (3)..(3)
<223> Xaa is Tyr or Ile

<220>
<221> MISC_FEATURE
<222> (5)..(5)
<223> Xaa is Ser or Thr

<220>

<221> MISC_FEATURE
<222> (8)..(16)
<223> Xaa is any amino acid

<400> 2

Gly Trp Xaa His Xaa His Pro Xaa Xaa Xaa Xaa Xaa Ser Xaa Xaa
1 5 10 15

Asp

<210> 3
<211> 246
<212> PRT
<213> Homo sapiens

<400> 3

Thr Met Ile Ile Met Asp Ser Phe Ala Leu Pro Val Glu Gly Thr Glu
1 5 10 15

Thr Arg Val Asn Ala Gln Ala Ala Ala Tyr Glu Tyr Met Ala Ala Tyr
20 25 30

Ile Glu Asn Ala Lys Gln Val Gly Arg Leu Glu Asn Ala Ile Gly Trp
35 40 45

Tyr His Ser His Pro Gly Tyr Gly Cys Trp Leu Ser Gly Ile Asp Val
50 55 60

Ser Thr Gln Met Leu Asn Gln Gln Phe Gln Glu Pro Phe Val Ala Val
65 70 75 80

Val Ile Asp Pro Thr Arg Thr Ile Ser Ala Gly Lys Val Asn Leu Gly
85 90 95

Ala Phe Arg Thr Tyr Pro Lys Gly Tyr Lys Pro Pro Asp Glu Gly Pro
100 105 110

Ser Glu Tyr Gln Thr Ile Pro Leu Asn Lys Ile Glu Asp Phe Gly Val
115 120 125

His Cys Lys Gln Tyr Tyr Ala Leu Glu Val Ser Tyr Phe Lys Ser Ser
130 135 140

Leu Asp Arg Lys Leu Leu Glu Leu Leu Trp Asn Lys Tyr Trp Val Asn
145 150 155 160

Thr Leu Ser Ser Ser Ser Leu Leu Thr Asn Ala Asp Tyr Thr Thr Gly
 165 170 175

Gln Val Phe Asp Leu Ser Glu Lys Leu Glu Gln Ser Glu Ala Gln Leu
 180 185 190

Gly Arg Gly Ser Phe Met Leu Gly Leu Glu Thr His Asp Arg Lys Ser
 195 200 205

Glu Asp Lys Leu Ala Lys Ala Thr Arg Asp Ser Cys Lys Thr Thr Ile
 210 215 220

Glu Ala Ile His Gly Leu Met Ser Gln Val Ile Lys Asp Lys Leu Phe
 225 230 235 240

Asn Gln Ile Asn Ile Ser
 245

<210> 4
 <211> 245
 <212> PRT
 <213> Homo sapiens

<400> 4

Thr Val Arg Val Ile Asp Val Phe Ala Met Pro Gln Ser Gly Thr Gly
 1 5 10 15

Val Ser Val Glu Ala Val Asp Pro Val Phe Gln Ala Lys Met Leu Asp
 20 25 30

Met Leu Lys Gln Thr Gly Arg Pro Glu Met Val Val Gly Trp Tyr His
 35 40 45

Ser His Pro Gly Phe Gly Cys Trp Leu Ser Gly Val Asp Ile Asn Thr
 50 55 60

Gln Gln Ser Phe Glu Ala Leu Ser Glu Arg Ala Val Ala Val Val Val
 65 70 75 80

Asp Pro Ile Gln Ser Val Lys Gly Lys Val Val Ile Asp Ala Phe Arg
 85 90 95

Leu Ile Asn Ala Asn Met Met Val Leu Gly His Glu Pro Arg Gln Thr
 100 105 110

Thr Ser Asn Leu Gly His Leu Asn Lys Pro Ser Ile Gln Ala Leu Ile
 115 120 125

His Gly Leu Asn Arg His Tyr Tyr Ser Ile Thr Ile Asn Tyr Arg Lys
 130 135 140

Asn Glu Leu Glu Gln Lys Met Leu Leu Asn Leu His Lys Lys Ser Trp
 145 150 155 160

Met Glu Gly Leu Thr Leu Gln Asp Tyr Ser Glu His Cys Lys His Asn
 165 170 175

Glu Ser Val Val Lys Glu Met Leu Glu Leu Ala Lys Asn Tyr Asn Lys
 180 185 190

Ala Val Glu Glu Glu Asp Lys Met Thr Pro Glu Gln Leu Ala Ile Lys
 195 200 205

Asn Val Gly Lys Gln Asp Pro Lys Arg His Leu Glu Glu His Val Asp
 210 215 220

Val Leu Met Thr Ser Asn Ile Val Gln Cys Leu Ala Ala Met Leu Asp
 225 230 235 240

Thr Val Val Phe Lys
 245

<210> 5
 <211> 421
 <212> PRT
 <213> Homo sapiens

 <400> 5

Met Pro Asp His Thr Asp Val Ser Leu Ser Pro Glu Glu Arg Val Arg
 1 5 10 15

Ala Leu Ser Lys Leu Gly Cys Asn Ile Thr Ile Ser Glu Asp Ile Thr
 20 25 30

Pro Arg Arg Tyr Phe Arg Ser Gly Val Glu Met Glu Arg Met Ala Ser
 35 40 45

Val Tyr Leu Glu Glu Gly Asn Leu Glu Asn Ala Phe Val Leu Tyr Asn
 50 55 50

Lys Phe Ile Thr Leu Phe Val Glu Lys Leu Pro Asn His Arg Asp Tyr
 65 70 75 80

Gln Gln Cys Ala Val Pro Glu Lys Gln Asp Ile Met Lys Lys Leu Lys
85 90 95

Glu Ile Ala Phe Pro Arg Thr Asp Glu Leu Lys Asn Asp Leu Leu Lys
100 105 110

Lys Tyr Asn Val Glu Tyr Gln Glu Tyr Leu Gln Ser Lys Asn Lys Tyr
115 120 125

Lys Ala Glu Ile Leu Lys Leu Glu His Gln Arg Leu Ile Glu Ala
130 135 140

Glu Arg Lys Arg Ile Ala Gln Met Arg Gln Gln Gln Leu Glu Ser Glu
145 150 155 160

Gln Phe Leu Phe Phe Glu Asp Gln Leu Lys Lys Gln Glu Leu Ala Arg
165 170 175

Gly Gln Met Arg Ser Gln Gln Thr Ser Gly Leu Ser Glu Gln Ile Asp
180 185 190

Gly Ser Ala Leu Ser Cys Phe Ser Thr His Gln Asn Asn Ser Leu Leu
195 200 205

Asn Val Phe Ala Asp Gln Pro Asn Lys Ser Asp Ala Thr Asn Tyr Ala
210 215 220

Ser His Ser Pro Pro Val Asn Arg Ala Leu Thr Pro Ala Ala Thr Leu
225 230 235 240

Ser Ala Val Gln Asn Leu Val Val Glu Gly Leu Arg Cys Val Val Leu
245 250 255

Pro Glu Asp Leu Cys His Lys Phe Leu Gln Leu Ala Glu Ser Asn Thr
260 265 270

Val Arg Gly Ile Glu Thr Cys Gly Ile Leu Cys Gly Lys Leu Thr His
275 280 285

Asn Glu Phe Thr Ile Thr His Val Ile Val Pro Lys Gln Ser Ala Gly
290 295 300

Pro Asp Tyr Cys Asp Met Glu Asn Val Glu Glu Leu Phe Asn Val Gln
305 310 315 320

Asp Gln His Asp Leu Leu Thr Leu Gly Trp Ile His Thr His Pro Thr

325

330

335

Gln Thr Ala Phe Leu Ser Ser Val Asp Leu His Thr His Cys Ser Tyr
 340 345 350

Gln Leu Met Leu Pro Glu Ala Ile Ala Ile Val Cys Ser Pro Lys His
 355 360 365

Lys Asp Thr Gly Ile Phe Arg Leu Thr Asn Ala Gly Met Leu Glu Val
 370 375 380

Ser Ala Cys Lys Lys Lys Gly Phe His Pro His Thr Lys Glu Pro Arg
 385 390 395 400

Leu Phe Ser Ile Cys Lys His Val Leu Val Lys Asp Ile Lys Ile Ile
 405 410 415

Val Leu Asp Leu Arg
 420

<210> 6
 <211> 461
 <212> PRT
 <213> Homo sapiens

<400> 6

Met Asp Gln Pro Phe Thr Val Asn Ser Leu Lys Lys Leu Ala Ala Met
 1 5 10 15

Pro Asp His Thr Asp Val Ser Leu Ser Pro Glu Glu Arg Val Arg Ala
 20 25 30

Leu Ser Lys Leu Gly Cys Asn Ile Thr Ile Ser Glu Asp Ile Thr Pro
 35 40 45

Arg Arg Tyr Phe Arg Ser Gly Val Glu Met Glu Arg Met Ala Ser Val
 50 55 60

Tyr Leu Glu Glu Gly Asn Leu Glu Asn Ala Phe Val Leu Tyr Asn Lys
 65 70 75 80

Phe Ile Thr Leu Phe Val Glu Lys Leu Pro Asn His Arg Asp Tyr Gln
 85 90 95

Gln Cys Ala Val Pro Glu Lys Gln Asp Ile Met Lys Lys Leu Lys Glu
 100 105 110

Ile Ala Phe Pro Arg Thr Asp Glu Leu Lys Asn Asp Leu Leu Lys Lys
115 120 125

Tyr Asn Val Glu Tyr Gln Glu Tyr Leu Gln Ser Lys Asn Lys Tyr Lys
130 135 140

Ala Glu Ile Leu Lys Lys Leu Glu His Gln Arg Leu Ile Glu Ala Glu
145 150 155 160

Arg Lys Arg Ile Ala Gln Met Arg Gln Gln Gln Leu Glu Ser Glu Gln
165 170 175

Phe Leu Phe Phe Glu Asp Gln Leu Lys Lys Gln Glu Leu Ala Arg Gly
180 185 190

Gln Met Arg Ser Gln Gln Thr Ser Gly Leu Ser Glu Gln Ile Asp Gly
195 200 205

Ser Ala Leu Ser Cys Phe Ser Thr His Gln Asn Asn Ser Leu Leu Asn
210 215 220

Val Phe Ala Asp Gln Pro Asn Lys Ser Asp Ala Thr Asn Tyr Ala Ser
225 230 235 240

His Ser Pro Pro Val Asn Arg Ala Leu Thr Pro Ala Ala Thr Leu Ser
245 250 255

Ala Val Gln Asn Leu Val Val Glu Gly Leu Arg Cys Val Val Leu Pro
260 265 270

Glu Asp Leu Cys His Lys Phe Leu Gln Leu Ala Glu Ser Asn Thr Val
275 280 285

Arg Gly Ile Glu Thr Cys Gly Ile Leu Cys Gly Lys Leu Thr His Asn
290 295 300

Glu Phe Thr Ile Thr His Val Ile Val Pro Lys Gln Ser Ala Gly Pro
305 310 315 320

Asp Tyr Cys Asp Met Glu Asn Val Glu Glu Leu Phe Asn Val Gln Asp
325 330 335

Gln His Asp Leu Leu Thr Leu Gly Trp Ile His Thr His Pro Thr Gln
340 345 350

Thr Ala Phe Leu Ser Ser Val Asp Leu His Thr His Cys Ser Tyr Gln
 355 360 365

Leu Met Leu Pro Glu Ala Ile Ala Ile Val Cys Ser Pro Lys His Lys
370 375 380

Asp	Thr	Gly	Ile	Phe	Arg	Leu	Thr	Asn	Ala	Gly	Met	Leu	Glu	Val	Ser
385					390					395					400

Ala Cys Lys Lys Lys Gly Phe His Pro His Thr Lys Glu Pro Arg Leu
 405 410 415

Phe Ser Ile Gln Lys Phe Leu Ser Gly Ile Ile Ser Gly Thr Ala Leu
420 425 430

Glu Met Glu Pro Leu Lys Ile Gly Tyr Gly Pro Asn Gly Phe Pro Leu
435 440 445

Leu Gly Ile Ser Arg Ser Ser Ser Pro Ser Glu Gln Leu
450 455 460

<310> 7
<311> 424
<312> PRT
<313> *Homo sapiens*

<400> 7

Met	Ser	Asp	His	Gly	Asp	Val	Ser	Leu	Pro	Pro	Glu	Asp	Arg	Val	Arg
1				5				10					15		

Ala Leu Ser Gln Leu Gly Ser Ala Val Glu Val Asn Glu Asp Ile Pro
20 25 30

Pro Arg Arg Tyr Phe Arg Ser Gly Val Glu Ile Ile Arg Met Ala Ser
35 40 45

Ile Tyr Ser Glu Glu Gly Asn Ile Glu His Ala Phe Ile Leu Tyr Asn
 50 55 60

Lys Tyr Ile Thr Leu Phe Ile Glu Lys Leu Pro Lys His Arg Asp Tyr
65 70 75 80

Lys Ser Ala Val Ile Pro Glu Lys Lys Asp Thr Val Lys Lys Leu Lys
 85 90 95

Arg Tyr Thr Lys Glu Tyr Thr Glu Tyr Asn Glu Glu Lys Lys Lys Glu
115 120 125

Ala Glu Glu Leu Ala Arg Asn Met Ala Ile Gln Gln Glu Leu Glu Lys
130 135 140

Glu Lys Gln Arg Val Ala Gln Gln Lys Gln Gln Leu Glu Gln Glu
145 150 155 160

Gln Phe His Ala Phe Glu Glu Met Ile Arg Asn Gln Glu Leu Glu Lys
165 170 175

Glu Arg Leu Lys Ile Val Gln Glu Phe Gly Lys Val Asp Pro Gly Leu
180 185 190

Gly Gly Pro Leu Val Pro Asp Leu Glu Lys Pro Ser Leu Asp Val Phe
195 200 205

Pro Thr Leu Thr Val Ser Ser Ile Gln Pro Ser Asp Cys His Thr Thr
210 215 220

Val Arg Pro Ala Lys Pro Pro Val Val Asp Arg Ser Leu Lys Pro Gly
225 230 235 240

Ala Leu Ser Asn Ser Glu Ser Ile Pro Thr Ile Asp Gly Leu Arg His
245 250 255

Val Val Val Pro Gly Arg Leu Cys Pro Gln Phe Leu Gln Leu Ala Ser
260 265 270

Ala Asn Thr Ala Arg Gly Val Glu Thr Cys Gly Ile Leu Cys Gly Lys
275 280 285

Leu Met Arg Asn Glu Phe Thr Ile Thr His Val Leu Ile Pro Lys Gln
290 295 300

Ser Ala Gly Ser Asp Tyr Cys Asn Thr Glu Asn Glu Glu Leu Phe
305 310 315 320

Leu Ile Gln Asp Gln Gln Gly Leu Ile Thr Leu Gly Trp Ile His Thr
325 330 335

His Pro Thr Gln Thr Ala Phe Leu Ser Ser Val Asp Leu His Thr His
340 345 350

Cys Ser Tyr Gln Met Met Leu Pro Glu Ser Val Ala Ile Val Cys Ser
355 360 365

Pro Lys Phe Gln Glu Thr Gly Phe Phe Lys Leu Thr Asp His Gly Leu
 370 375 380

Glu Glu Ile Ser Ser Cys Arg Gln Lys Gly Phe His Pro His Ser Lys
 385 390 395 400

Asp Pro Pro Leu Phe Cys Ser Cys Ser His Val Thr Val Val Asp Arg
405 410 415

Ala Val Thr Ile Thr Asp Leu Arg
420

<210> 8
<211> 58
<212> PRT
<213> Homo sapiens

<400> 8

Val Gly Arg Leu Glu Asn Ala Ile Gly Trp Tyr His Ser His Pro Gly
1 5 10 15

Tyr Gly Cys Trp Leu Ser Gly Ile Asp Val Ser Thr Gln Met Leu Asn
 20 25 30

Gln Gln Phe Gln Glu Pro Phe Val Ala Val Val Ile Asp Pro Thr Arg
35 40 45

Thr Ile Ser Ala Gly Lys Val Asn Leu Gly
50 55

<210> 9
<211> 58
<212> PRT
<213> Drosophila melanogaster

<400> 9

Val Gly Arg Met Glu His Ala Val Gly Trp Tyr His Ser His Pro Gly
1 5 10 15

Tyr Gly Cys Trp Leu Ser Gly Ile Asn Val Ser Thr Gln Met Leu Asn
 20 25 30

Gln Thr Tyr Gln Glu Pro Phe Val Ala Ile Val Val Asp Pro Val Arg
35 40 45

Thr Val Ser Ala Gly Lys Val Cys Leu Gly
 50 55

<210> 10
 <211> 58
 <212> PRT
 <213> Arabidopsis thaliana
 <400> 10

Ala Gly Arg Leu Glu Asn Val Val Gly Trp Tyr His Ser His Pro Gly
 1 5 10 15

Tyr Gly Cys Trp Leu Ser Gly Ile Asp Val Ser Thr Gln Arg Leu Asn
 20 25 30

Gln Gln His Gln Glu Pro Phe Leu Ala Val Val Ile Asp Pro Thr Arg
 35 40 45

Thr Val Ser Ala Gly Lys Val Glu Ile Gly
 50 55

<210> 11
 <211> 58
 <212> PRT
 <213> Caenorhabditis elegans
 <400> 11

Glu Gly Arg Lys Glu Lys Val Val Gly Trp Tyr His Ser His Pro Gly
 1 5 10 15

Tyr Gly Cys Trp Leu Ser Gly Ile Asp Val Ser Thr Gln Thr Leu Asn
 20 25 30

Gln Lys Phe Gln Glu Pro Trp Val Ala Ile Val Ile Asp Pro Leu Arg
 35 40 45

Thr Met Ser Ala Gly Lys Val Asp Ile Gly
 50 55

<210> 12
 <211> 58
 <212> PRT
 <213> Archaeoglobus fulgidus
 <400> 12

Leu Pro Ile Gly Met Lys Val Phe Gly Thr Val His Ser His Pro Ser
 1 5 10 15

Pro Ser Cys Arg Pro Ser Glu Glu Asp Leu Ser Leu Phe Thr Arg Phe
 20 25 30

Gly Lys Tyr His Ile Ile Val Cys Tyr Pro Tyr Asp Glu Asn Ser Trp
 35 40 45

Lys Cys Tyr Asn Arg Lys Gly Glu Glu Val
 50 55

<210> 13
 <211> 58
 <212> PRT
 <213> Pyrococcus horikoshii

<400> 13

Met Pro His Asp Glu Ser Ile Lys Gly Thr Phe His Ser His Pro Ser
 1 5 10 15

Pro Phe Pro Tyr Pro Ser Glu Gly Asp Leu Met Phe Phe Ser Lys Phe
 20 25 30

Gly Gly Ile His Ile Ile Ala Ala Phe Pro Tyr Asp Glu Asp Ser Val
 35 40 45

Lys Ala Phe Asp Ser Glu Gly Arg Glu Val
 50 55

<210> 14
 <211> 58
 <212> PRT
 <213> Thermoplasma volcanium

<400> 14

Lys Pro Ile Asp Phe Ser Leu Val Gly Ser Val His Ser His Pro Ser
 1 5 10 15

Gly Ile Thr Lys Pro Ser Asp Glu Asp Leu Arg Met Phe Ser Leu Thr
 20 25 30

Gly Lys Ile His Ile Ile Val Gly Tyr Pro Tyr Asn Leu Lys Asp Tyr
 35 40 45

Ser Ala Tyr Asp Arg Ser Gly Asn Lys Val
 50 55

<210> 15

<211> 58
<212> PRT
<213> Methanobacterium thermoautotrophicum

<400> 15

Leu Pro Pro Phe Thr Gly Ala Val Gly Ser Val His Ser His Pro Gly
1 5 10 15

Pro Val Asn Leu Pro Ser Ala Ala Asp Leu His Phe Phe Ser Lys Asn
20 25 30

Gly Leu Phe His Leu Ile Ile Ala His Pro Tyr Thr Met Glu Thr Val
35 40 45

Ala Ala Tyr Thr Arg Asn Gly Asp Pro Val
50 55

<210> 16
<211> 58
<212> PRT
<213> Aquifex aeolicus

<400> 16

Ile Ser Lys Gly Met Glu Ile Val Gly Val Tyr His Ser His Pro Asp
1 5 10 15

His Pro Asp Arg Pro Ser Gln Phe Asp Leu Gln Arg Ala Phe Pro Asp
20 25 30

Leu Ser Tyr Ile Ile Phe Ser Val Gln Lys Gly Lys Val Ala Ser Tyr
35 40 45

Arg Ser Trp Glu Leu Lys Gly Asp Lys Phe
50 55

<210> 17
<211> 60
<212> PRT
<213> Mycobacterium tuberculosis

<400> 17

Glu Asp Ala Asp Glu Val Pro Val Val Ile Tyr His Ser His Thr Ala
1 5 10 15

Thr Glu Ala Tyr Pro Ser Arg Thr Asp Val Lys Leu Ala Thr Glu Pro
20 25 30

Asp Ala His Tyr Val Leu Val Ser Thr Arg Asp Pro His Arg His Glu

35

40

45

Leu Arg Ser Tyr Arg Ile Val Asp Gly Ala Val Thr
 50 55 60

<210> 18
 <211> 58
 <212> PRT
 <213> Escherichia coli

<400> 18

Ile Lys Ile Asn Ala Ser Ala Leu Ile Leu Ala His Asn His Pro Ser
 1 5 10 15

Gly Cys Ala Glu Pro Ser Lys Ala Asp Lys Leu Ile Thr Glu Arg Ile
 20 25 30

Ile Lys Ser Cys Gln Phe Met Asp Leu Arg Val Leu Asp His Ile Val
 35 40 45

Ile Gly Arg Gly Glu Tyr Val Ser Phe Ala
 50 55

<210> 19
 <211> 57
 <212> PRT
 <213> Drosophila melanogaster

<400> 19

Thr Gly Arg Pro Glu Met Val Val Gly Trp Tyr His Ser His Pro Gly
 1 5 10 15

Phe Gly Cys Trp Leu Ser Gly Val Asp Ile Asn Thr Gln Gln Ser Phe
 20 25 30

Glu Ala Leu Ser Glu Arg Ala Val Ala Val Val Val Asp Pro Ile Gln
 35 40 45

Ser Val Lys Gly Lys Val Val Ile Asp
 50 55

<210> 20
 <211> 57
 <212> PRT
 <213> Homo sapiens

<400> 20

Thr Gly Arg Pro Glu Met Val Val Gly Trp Tyr His Ser His Pro Gly

1

5

10

15

Phe Gly Cys Trp Leu Ser Gly Val Asp Ile Asn Thr Gln Gln Ser Phe
20 25 30

Glu Ala Leu Ser Glu Arg Ala Val Ala Val Val Val Asp Pro Ile Gln
35 40 45

Ser Val Lys Gly Lys Val Val Ile Asp
50 55

<210> 21
<211> 57
<212> PRT
<213> Dictyostelium discoideum

<400> 21

Thr Gly Arg Asp Glu Ile Val Ile Gly Trp Tyr His Ser His Pro Gly
1 5 10 15

Phe Gly Cys Trp Leu Ser Ser Val Asp Val Asn Thr Gln Gln Ser Phe
20 25 30

Glu Gln Leu Gln Ser Arg Ala Val Ala Val Val Val Asp Pro Leu Gln
35 40 45

Ser Val Arg Gly Lys Val Val Ile Asp
50 55

<210> 22
<211> 57
<212> PRT
<213> Saccharomyces cerevisiae

<400> 22

Thr Gly Arg Asp Gln Met Val Val Gly Trp Tyr His Ser His Pro Gly
1 5 10 15

Phe Gly Cys Trp Leu Ser Ser Val Asp Val Asn Thr Gln Lys Ser Phe
20 25 30

Glu Gln Leu Asn Ser Arg Ala Val Ala Val Val Val Asp Pro Ile Gln
35 40 45

Ser Val Lys Gly Lys Val Val Ile Asp
50 55